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# INSIDER

Newsletter for the Employees of Ames Laboratory ■ Volume 19, Number 2 ■ February 2008

## Anderson Wins TMS Distinguished Scientist Award

Senior metallurgist honored by Electronic, Magnetic & Photonic Materials Division

Iver Anderson, senior metallurgist, has been selected to receive the 2007 Distinguished Scientist/Engineer Award by the Electronic, Magnetic & Photonic Materials Division of The Minerals, Metals & Materials Society.

Anderson is only the second person selected for the award, which will be presented at the TMS Annual Meeting March 9-13 in New Orleans. The award, which is presented based on a lengthy nomination and peer review process, honors Anderson specifically for his

Lab and Iowa State University.

The award cites Anderson “for his innovative ideas, his excellent research, his continuing scholarship and the influence he has had on the transition to Pb-free manufacturing.”

Anderson said, “I feel quite honored to receive this award, particularly because it comes from peers in my ‘home’ society (TMS), many of whom have been involved in lead-free solder development.”

Anderson will receive the recognition at the 137th TMS honors and awards banquet

*“I feel quite honored to receive this award because it comes from my peers.”*

development of a tin-silver-copper solder alloy that has been widely adopted by the electronics industry to remove harmful lead from the environment. To date, the patented lead-free solder has been licensed by some 60 companies worldwide and has generated more than \$16 million in royalties for Ames

on the evening of March 11. Anderson will have company on the awards podium as Karl Gschneidner will be presented with the Acta Materialia Gold Medal, considered by many to be the top award in the materials science field. ■

~ Kerry Gibson



Iver Anderson displays a sample of his lead-free solder wire.

## Lab Shows 3-D Photonic Crystals Make Novel Add-drop Filters

*Highly efficient filters promise enhanced data transmission for optical networks*

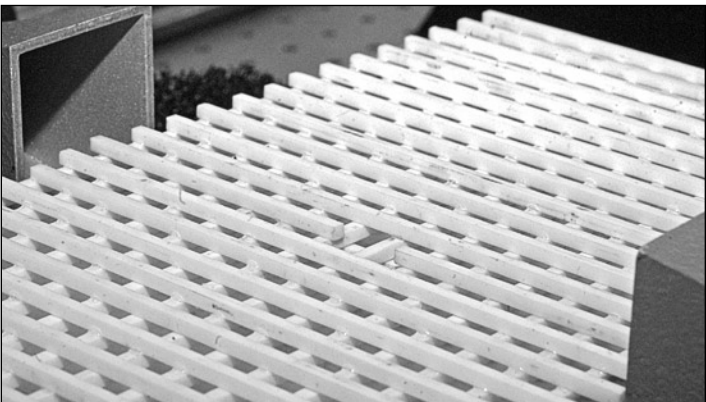
Ames Laboratory researchers have come up with a potentially perfect way to sort and distribute the massive amounts of data that travel daily over optical fibers to people throughout the world. The new technology, a three-dimensional photonic crystal add-drop filter, promises greatly enhanced transmission of multiple wavelength channels (wavelengths of light) traveling along the same optical fiber.

The innovative filter is a significant achievement in the effort to develop all-optical transport networks that would eliminate electrical components from optical transmission links and guarantee virtually flawless data reception to end users of the Internet and other fiber-based telecommunications systems.

“There are up to 160 wavelength channels traveling through an optical fiber at the same time,” says Rana Biswas, physicist and one of the developers of the new add-drop filter. “That means a lot of dialogue is going on simultaneously.”

Biswas, who is also an Iowa State University adjunct associate professor of physics and astronomy and electrical and computer engineering, explains that as information is transported over these multiple channels, it’s necessary to drop off individual wavelength channels at different points on the fiber. At the same time, it’s essential to be able to add data streams into unfilled wavelength channels.

“When the data being transported in multiple frequency channels over an optical fiber comes to a receiving station, you want to be able to pick off just one of those frequencies and send it to an individual end user,” says Biswas. “That’s where these 3-D photonic crystals come into play.”



*The image shows the central portion of a layer-by-layer photonic crystal composed of alumina rods. There, input and output waveguides are formed by a missing rod. These waveguides are separated by an alumina rod segment.*

Biswas and his colleagues, Kai-Ming Ho, senior physicist and an ISU Distinguished Professor of Liberal Arts and Sciences; Gary Tuttle, an ISU associate professor of electrical and computer engineering and a researcher at IPRT’s Microelectronics Research Center; and Preeti Kohli, a former Iowa State Ph.D. student now at Micron in Manassas, Va., successfully demonstrated that 3-D photonic crystals could serve as add-drop filters, providing greatly enhanced data transmission.

To prove their concept, the researchers used a three-dimensional, microwave-scale photonic crystal constructed from layered

alumina rods and containing a full bandgap – a wavelength range in which electromagnetic waves cannot transmit. Just as electronic bandgaps prevent electrons within a certain energy range from passing through a semiconductor, photonic crystals create photonic bandgaps that confine light of certain wavelengths.

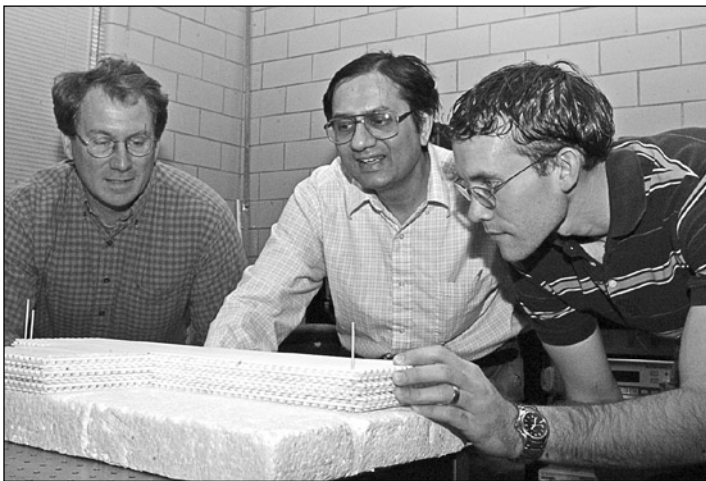
The add-drop filter created by the Ames Lab team contains an entrance waveguide and an exit waveguide created by removing rod segments from the layered photonic crystal. (A waveguide is a system or material that can confine and direct electromagnetic waves.) A one-rod segment separates the two waveguides. A defect cavity is located one unit cell above the waveguide layer. The waveguides can communicate through the cavity, allowing a specific wavelength frequency to be selected from the input waveguide and transmitted to the output waveguide, excluding other input frequencies and resulting in near 100 percent efficiency for the drop frequencies.

The idea of using photonic crystals for add-drop filters is not new. Since the mid 1990s, many groups worldwide have been working to develop the technology with two-dimensional photonic crystals.

“It works,” Biswas says, “but there is loss of some intensity to the end user because 2-D photonic crystals don’t confine the light completely. For example, in a phone conversation, the voices would dim out. But with 3-D photonic crystal add-drop filters, the communication would be clear.”

Although Biswas, Kohli, Tuttle and Ho have shown that 3-D photonic crystals would make highly efficient add-drop filters, there are still problems to address. Getting the size of the photonic crystals down to work at the wavelengths used for Internet communications – 1.5 microns – is the big challenge. The group now has some of these photonic crystals working in that range, but to make these controlled structures with one input, another output and a defect ... that definitely takes some work. A future direction is to simplify the design of the add-drop filter by reducing the layers in the photonic crystal – perhaps having all the action happen in one layer. ■

*~ Saren Johnston*



*(left to right) Gary Tuttle, Rana Biswas and graduate student Dan Stieler examine defects in a photonic crystal. Not pictured are Kai-Ming Ho and Preeti Kohli.*



## In the Spotlight

### Thank You Science Bowl Volunteers

Many thanks go out to the following volunteers who generously shared their time and expertise with the 2008 Ames Laboratory/Iowa State University High School Science Bowl program. Science Bowl is only possible because of the support of these dedicated and enthusiastic volunteers.

Mike Agron  
Vellareddy Anantharam  
Jim Anderegg  
Iver Anderson  
Chris Arku  
Iryna Auferonak  
Stan Bajic  
Tom Barton  
Diane Bassham  
Amy Bergarud  
Jim Brazelton  
Sergey Bud'ko  
Whitney Bynum  
Chelsea Clinton  
Nancy Clough  
Elliot Combs  
Deb Covey  
Nuku Doamekpor  
Scott Drake  
Mike Drob  
Laron Evans  
Cynthia Feller  
Breehan Gerleman Lucchesi  
Kerry Gibson  
Lindsey Gordon  
David Grant  
Jessica Greenwood  
Heidi Hageman  
Lee Harker  
Bruce Harmon  
Denise Hix  
David Hoffman  
Malika Jeffries-EL  
Cynthia Jenks  
Saren Johnston  
Paul Kapke  
Steve Karsjen  
Zainab Khan  
Alex King  
Mike Krapfl  
George Kraus  
Kay Lampe Hannasch  
Katherine Lawler  
Eugene Levin  
Delise Lockett  
Leigh Ann Long  
Grant Luhmann  
Thinh Luong

Mark Maffett  
Matt Mead  
Kimberly Meier  
Brad Miller  
Bob Mills  
Ryan Mumm  
Diane Muncrief  
Mark Murphy  
Forrest Nutter  
Connie O'Brien  
Brian Patterson  
Timothy Pearson  
Yamille Perez  
Laura Petersen  
Alex Preston  
Ellen Price  
Dexter Rassavong  
Jon Reneberg  
Jameson Sabin  
Aaron Sadow  
Deb Samuelson  
Mingmin Shen  
Lindsay Short  
Alex Smith  
Emily Smith  
Trevon Smith  
Sarom Sok  
Mike Stahr  
Bailey Steinfadt  
Anne Stockdale  
Chris Strasburg  
Amber Strohhahn  
Yuly Suvorov  
Pat Thiel  
R. Bruce Thompson  
Jordon Trachtenberg  
Allison Tyler  
Connie Vaclav  
George Vardaxis  
Stan Welp  
Daniel White  
Tiffany Woods  
Cassandra Wright  
Min Xu  
Edward Yu  
Amy Zhong



*Steve Karsjen (right) presents Jim Brazelton, materials and transportation manager, with a 10-year Science Bowl volunteer pin.*

*Saren Johnston, communications specialist, looks at an award recognizing her contributions to Science Bowl. Johnston, who will retire in June, has been involved with Science Bowl since the program began at Ames Lab in 1991.*



### New Employees

Durdu Guney, postdoctoral fellow (Costas Soukoulis)  
Mahmud Khan, postdoctoral fellow (Karl Gschneidner)  
Jian Min, postdoctoral fellow (Rodney Fox)  
Makariy Tanatar, assistant scientist III (Ruslan Prozorov)  
Jun Zhong, postdoctoral fellow (Bulent Biner)

# Cedar Rapids-Marion Home School Wins High School Science Bowl

Defeats Des Moines Central Academy to win 18th annual Ames Lab/ISU event

In only its second year of competition, a team of home-schooled students from Cedar Rapids-Marion won the 18th annual Ames Laboratory/Iowa State University Regional Science Bowl on Jan. 26. The Cedar Rapids-Marion team defeated Central Academy of Des Moines 48-42 in the championship match.

The Cedar Rapids-Marion team, comprised of seniors Leif Gaebler and Edward Talmage, juniors Evan Gaebler and Andrew Baskerville and freshman Alan Talmage had a perfect record for the day. They won all five round-robin matches in the morning and defeated West Des Moines Valley (Team 2), Ames, Home Schools of Eastern Iowa, and Central Academy on their way to the championship match.

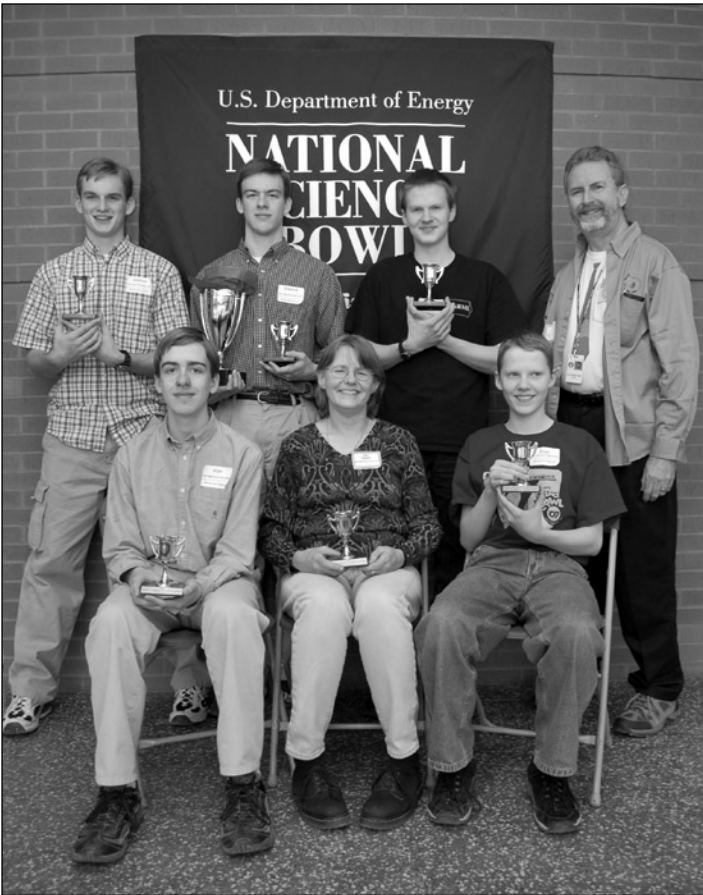
“We came into the competition confident,” said Edward Talmage, captain of the Cedar Rapids-Marion team. “We tied for fifth place in our first year of competition, so we thought we had a shot at winning this year.”

Cedar Rapids-Marion will now advance to the U.S. Department of Energy’s National Science Bowl® May 1-6 in Washington D.C.

Second-place winner Central Academy defeated Cedar Rapids Washington, Bettendorf and Cedar Falls before losing to Cedar Rapids-Marion Home Schools. Central Academy then defeated West Des Moines Valley (Team 1) 86-40 in the consolation half of the bracket to earn a rematch with Cedar Rapids-Marion.

Nearly 90 members of the Ames Lab and ISU community volunteered as moderators, judges, timekeepers and scorekeepers. In addition to Ames Lab, IPRT and ISU, financial support was offered by: 3M, Dow Corning Foundation, Rockwell Collins, Hach, Sauer-Danfoss, Pella Corp. and HyVee. ■

~ Kerry Gibson



The first-place Cedar Rapids-Marion Home School team: (standing, left to right) Andrew Baskerville, Edward Talmage, Leif Gaebler and Ames Lab director Alex King; (sitting, left to right) Alan Talmage, coach Sally Gaebler and Evan Gaebler.



“I was so close!”



“What do you think?” Competitors confer on a difficult bonus question.



Competitors and spectators gather around the tournament brackets.



The South Hamilton team members “I’m With Smart” T-shirts celebrate the brainy company they keep.



(left to right) Chris Strasburg, Iver Anderson, Diane Bassham and Nancy Clough wait for an answer to a toss-up question.



Jefferson’s team brought a good luck charm: Seymour Squeakers, a plastic rat. “Seymour intimidates our opponents,” say the Jefferson competitors.



(left to right) Volunteers Alex King, Cynthia Jenks and Mark Murphy.



The Urbandale team’s official cheering section, the SciFans.

## ESH&A Conducts Safety Walk-Throughs in TASF

*Good housekeeping practices keep office spaces safe*

ESH&A conducted walk-throughs of the offices in TASF on Feb. 20. The walk-through team, led by industrial safety specialist Shawn Nelson, evaluated each space in TASF based on environmental, safety and health concerns such as fire safety, electrical safety, waste management and industrial hygiene.

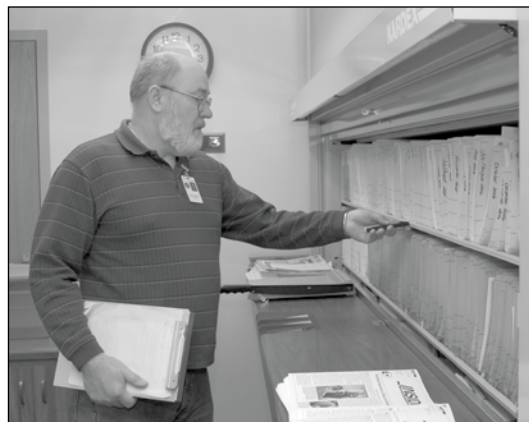
“Many office incidents are caused by poor housekeeping practices,” says Nelson. “By keeping your office both neat and clean, you can eliminate a lot of hazards.”

Here are office housekeeping tips and a few other workspace safety guidelines:

- Keep paper and boxes off the floor, recycle soda cans and bottles right away to get them out of your office, keep your desk organized, don't stack items that could become unstable and tip over, and get rid of obsolete equipment like old computer monitors.
- Keep electrical cords, phone lines and computer data cords neatly bundled under tables or desks so they don't get tangled up with your feet and cause damage to equipment. Do not run cords across walkways and do not tape cords down or run them under rugs.
- Use extension cords only as a temporary (24 hours or less) power source. A power need lasting longer than 24 hours requires that either a permanent power source be installed or that the equipment be moved to a permanent power source.
- Do not “daisy chain” (connect one item to another) temporary power taps and extension cords to provide more outlets or to get

power to where it's needed. Contact Facilities Services to have additional outlets installed.

- Use temporary power taps (available from the Ames Lab store-room) to power computers, printers, scanners and other electrically sensitive equipment. Temporary power taps should not be used for equipment such as microwave ovens or refrigerators because these larger appliances may exceed the power tap 15 amp capacity.
- Store items *in* bookshelves and cabinets rather than *on top* of bookshelves and cabinets. Nothing is to be stored or placed within 18 inches of the ceiling to ensure that the sprinkler system works properly in the event of a fire.
- Book cases must be secured to an adjacent wall, post or floor. ■



**John Hjortshoj, electrical safety specialist, examines the Lektriever filing carousel in Public Affairs during the ESH&A walk-through on Feb. 20.**



### Lab Takes Heart on Valentine's Day

Audrey Hohanshelt, program coordinator in Occupational Medicine, checks ESH&A manager Tom Wessels' blood pressure on Valentine's Day. “First they have to make sure I have a heart,” joked Wessels. (He does.) According to Hohanshelt, one of the tips for preventing heart disease – along with a healthy diet and exercise – is having your blood pressure checked regularly so you know you are in the normal range (less than 120/80). “Ames Lab staff are welcome to stop by Occupational Medicine at any time to get their blood pressure checked,” says Hohanshelt.



### Sauer-Danfoss Donates to Science Bowl

Sauer-Danfoss, Inc. of Ames recently donated \$1,000 to the 2008 Science Bowl program. Matt Bendler, Human Resources director for the Americas Region, presented the check to Steve Karsjen, Ames Laboratory/ISU Science Bowl coordinator. “As an organization, Sauer-Danfoss is very proud to be involved in the Science Bowl,” said Bendler. “The Ames Laboratory and ISU continue to create a great competition that combines the development of science and math skills with a fun, interactive event.”

## DOE Selects ISU to Compete in Solar Decathlon Building Competition

*Team to build livable, fully solar-powered home*

The U.S. Department of Energy has selected Iowa State University as one of 20 teams from 25 colleges and universities to compete in the fourth DOE Solar Decathlon in the fall of 2009 in Washington, D.C.

Solar Decathlon teams design, build and operate attractive and energy-efficient, 800-square-foot solar-powered homes. Each team is awarded \$100,000 over two years to support the Solar Decathlon's research goal of reducing the cost of solar-powered homes and advancing solar technology.

In the fall of 2009, the National Mall will be transformed into a showcase for cutting-edge solar and building technologies as Solar Decathlon homes are displayed in a solar village.

ISU faculty and students from 11 departments in five colleges have met weekly for more than a year to establish the first Solar Decathlon team from the state of Iowa. Several Ames Lab associate scientists and Ames Lab Public Affairs manager Steve Karsjen will participate in the project.

“Iowa State will bring a new and distinctive perspective to the competition with our strengths in design, engineering and agricultural technologies,” says ISU assistant professor of architecture Ulrike Passe, who is heading the effort.

“The project also offers our students a fantastic opportunity to solve real-world problems in an interdisciplinary and team-oriented setting,” Passe says.

More than 100 ISU students are expected to participate, either as extracurricular activity through the Solar Decathlon Club, in specific for-credit courses, or through assignments and projects in other related courses.

The Solar Decathlon gets its name from the 10 specific areas of competition: architecture, engineering, market viability, commu-

nications, comfort, appliances, hot water, lighting, energy balance, and transportation. In addition to producing enough electricity and hot water to perform all the functions of a home, from powering lights and electronics to cooking, washing clothes and dishes, each home must produce surplus energy sufficient to power an electric car. The team that finishes the week of competition with the most points wins.

“Our house is a laboratory for ongoing research into design for extreme climates. In our case, we need to accommodate Iowa's cold winters and hot, humid summers,” Passe says.

Iowa State's entry, the Interlock House, will combine active and passive heating and cooling strategies to create thermal comfort and energy efficiency.

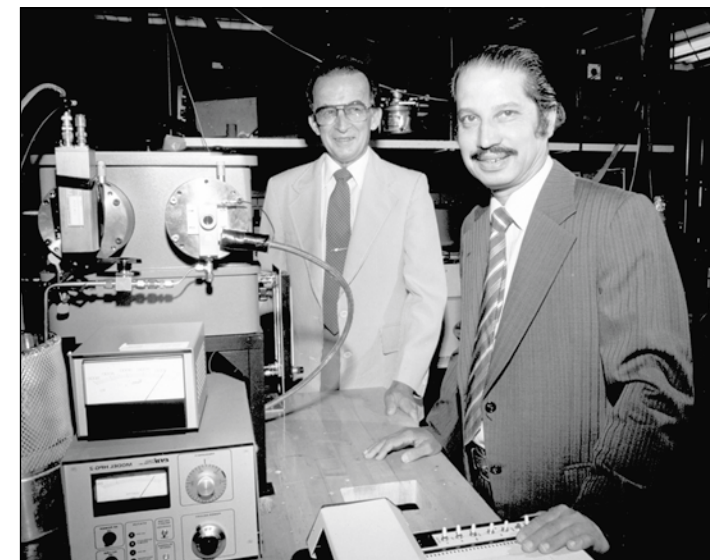
During phase one, which begins this spring, several panels and technical components will be designed, constructed and tested on campus to evaluate and verify the performance of critical parts. Phase two will begin in spring 2009 and involve complete assembly of the house on campus. In August 2009, the house will be disassembled, transported to Washington, D.C., and reassembled.

After 2009, ISU's Solar Decathlon house will be reconstructed on campus to serve as an educational facility and laboratory for green building technology and systems performance testing.

Ames Lab is an affiliated campus unit and a sponsor of the Decathlon team. Other sponsors include IPRT, ISU Provost Office, Iowa Energy Center, ISU College of Design, ISU College of Engineering, ISU Center for Building Energy Research and ISU Department of Architecture.

For more information about the U.S. Department of Energy Solar Decathlon, including photos of completed houses from the 2007 competition, visit: <http://www.solardecathlon.org/>. ■

## Remembering Art D'Silva



**Art D'Silva (foreground) and Velmer Fassel with the Helium Afterglow Discharge Detector they developed. D'Silva, Fassel and Gary Rice won a 1986 R&D 100 award for their work on the detector.**

Arthur P. D'Silva, a longtime Ames Laboratory scientist, passed away Feb. 17 in Ames. He was 80.

D'Silva was a senior chemist at the Lab, where he worked from 1968 to 1994.

During most of his career at Ames Lab, D'Silva worked closely with Velmer Fassel on research in various types of spectroscopy.

“Art's work on laser excited Spolskii spectroscopy, in particular, was a big development scientifically,” says Sam Houk, senior chemist. “He knew a lot about the practical aspects of spectroscopy.”

In the 1980s, D'Silva launched a company, CETAC Technologies, with his son, Collin. CETAC has grown into a worldwide leader in sample handling and sample introduction equipment for atomic spectroscopy and elemental analysis.

“CETAC is very important to the scientific community,” Houk says. “Many scientists use CETAC products to do their individual research, and that can be counted as one of Art's lasting legacies.”

D'Silva is survived by three sons and their spouses and four grandchildren. Memorials may be sent to St. Thomas Aquinas Catholic Church. ■

### Volunteers Needed for Middle School Science Bowl

The Ames Laboratory/ISU Middle School Science Bowl will be Saturday, April 19. Volunteers are needed to serve as moderators, judges, timekeepers and scorekeepers.

All volunteers will receive a free Science Bowl T-shirt and lunch on the day of competition.

For more information or to volunteer, contact Breehan Gerleman Lucchesi, Ames Lab Public Affairs, 4-9750, [breehan@ameslab.gov](mailto:breehan@ameslab.gov).

### Volunteers Needed for Science Fair

The State Science and Technology Fair of Iowa is looking for volunteer judges. The event will be Friday, March 28 and Saturday, March 29 at the Iowa State Center. To sign up, visit: <http://www.sciencefairiowa.org/>



Think  
Spring



## ***INSIDER***

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